AUTUMN FEEDING AND FLOCKING HABITS OF THE MOURNING DOVE IN SOUTHERN MISSOURI

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DURING the course of several years' hunting in south-central Missouri, some observations on the autumn habits of the Mourning Dove (*Zenaidura macroura*) have been accumulated that seem worth recording. The dove is not an abundant bird in the Ozark uplands, but from 1939 through 1942 I have taken 234 Mourning Doves during legal shooting periods, nearly all in one locality three miles southeast of West Plains, Howell County. Records of each trip have been kept in a hunting journal, and these form the basis for the following notes.

Feeding Habits

It has been pointed out by Moore and Pearson (1941), and noticed by many others, that Mourning Doves do not scratch for their food; since they are unable to cling to upright stalks and twigs, they are limited, with occasional exceptions (Bent, 1932:408), to the selection of food lying available on the surface of the ground. There are constant adjustments in the fall feeding habits of doves, apparently conditioned by the changing availability of surface foods. The following examples illustrate how the birds adapt their foraging in accordance with the limitations imposed by weak legs and feet.

In the accompanying table are enumerated the principal crop contents of the doves killed during this period. Quantitative analyses of crop content were not made, but all the most prominent foods are recorded. It will be seen that during September of 1939, and of 1940, the birds fed mostly on foxtail (*Setaria viridis*), which often grows abundantly in corn fields, and is admirably suited to the foraging needs of doves. The seeds ripen in August and almost immediately fall to the ground, where they are readily available until the fall rains have washed them into the soil. After this has occurred the doves turn their attention to other foods as they become available, including barnyard grass (*Echinochloa crusgalli*), pigweeds (*Amaranthus,* sp.), ragweed (*Ambrosia artemisiifolia*), dove weeds (*Croton* sp.), and various cultivated crops indicated in the table, all of which ripen somewhat later, but like foxtail shed their seeds onto the ground, either naturally or during processes of crop harvest. In September of these years, however, foxtail was the most important food. This plant has been elsewhere reported as a prominent dove food: Dutcher (1903) found as many as 6,400 seeds in one crop; and Knappen (1938) found foxtail to be the dominant July and August dove food in the southeast.

In 1941 and 1942, however, due perhaps to changed conditions of rainfall or temperature, there was no foxtail crop in this area, and the doves had to adjust their September feeding accordingly. Wheat, bar-

TABLE 1

PRINCIPAL CONTENTS OF THE CROPS OF 234 MOURNING DOVES KILLED IN THE VICINITY OF WEST PLAINS, HOWELL COUNTY, MISSOURI

Date	No. of birds	Principal crop contents
1939		
Sept. 10	6	Foxtail (*Setaria viridis*)
Sept. 14	8	Foxtail
Sept. 16	6	Foxtail
Oct. 7	5	Foxtail
Oct. 15	4	Mostly soybeans and cowpeas; some ragweed (*Ambrosia artemisiifolia*), smartweed (*Polygonum* sp.), pigweed (*Amaranthus* sp.), and foxtail
Oct. 31	7	Corn, cane, barnyard grass (*Echinochloa crusgalli*)
1940		
Sept. 2	5	Mostly wheat; some foxtail
Sept. 8	17	Foxtail
Sept. 10	3	Foxtail
Sept. 22	13	Dove weed (*Croton* sp.)
Sept. 26	7	Foxtail and barnyard grass
Sept. 29	2	Dove weed
Oct. 4	3	Cowpeas and corn
Oct. 17	2	Ragweed, barnyard grass and pigweeed
1941		
Sept. 6	10	Wheat, dove weed
Sept. 7	5	Wheat
Sept. 14	20	Wheat, pigweed
Sept. 28	10	Cane, barnyard grass
Oct. 3	8	Mostly cane; smartweed in two crops
Oct. 4	16	Millet (*Setaria italica*)
Oct. 5	14	Cane; a little smartweed and pigweed
1942		
Sept. 2	9	Wheat, millet, barley and dove weed; traces of corn
Sept. 5	15	Wheat, barley and millet
Sept. 12	4	Mostly millet; a little wheat
Sept. 16	11	Cane; traces of pigweed, red (?) clover
Sept. 18	24	Cane; traces of pigweed in three crops

ley, and millet (*Setaria italica*) were gleaned from the summer stubbles until the later weeds and crops ripened. Winter wheat, which ripens in June, largely meets the summer needs of doves, and is mentioned by Bent (1932) as a universally favorite food. But the limited supply of waste grain on the ground diminishes by late summer, and the doves readily turn to other foods when they can be had. In foxtail years this change is made in August, but when the foxtail fails to make a crop, it is September before other suitable foods appear in quantity.

The change to a newly available source of food may occur very quickly. On September 5, 1942, a concentration of approximately 200 doves was found in a wheat stubble, and the crops of 15 captured birds were filled largely with wheat. A week later, on September 12, practically no birds remained in this stubble, and it was September 16 before

I again found the local population, this time in a field of standing cane a half mile from the wheat field. All the birds were feeding on fragments of cane seed, which were dropped to the ground by thousands of blackbirds as they fed on the upright heads. The almost complete shift of the doves from wheat to cane, occurring apparently between September 5 and 12, was made possible in this instance by the "threshing" of the seeds by blackbirds. Cane is an important fall and winter food here, as it is in Alabama (Moore and Pearson, 1941), but is normally available to doves only after cutting.

Interestingly enough, Korean lespedeza (*L. stipulacea*), which has been widely introduced in southern Missouri during the past decade and is now a favorite quail food, is apparently not used by doves. It has not been found in any of the crops examined, even of birds taken during October when the seeds are lying abundantly on the ground. Either doves find it unpalatable (suggesting another limitation on the utilization of foods besides availability), or they have not yet learned to use it.

Flocking Habits

In August, the doves are widely distributed over the agricultural sections of Howell County, only the very favorable feeding grounds attracting concentrations of any consequence. At that time the flocks are loosely organized, behaving as Bent (1932:409) has described: "As we watch a number of doves feeding in a stubble field we soon see that there is no very strong tie binding together the members of the company—no such bond as holds together a flock of sandpipers. . . . The doves are spread out over the ground . . . feeding . . . like grazing cattle. . . . The flock when alarmed, instead of moving off as a unit, breaks up and the birds retreat individually or in pairs."

However, with the first cold rains in September some of the doves migrate, and a gradual change becomes apparent in the social relations of the remaining birds. Large concentrations form on a few of the best feeding grounds, and practically all the birds assemble at one or another of these favored points. By October 1 there are no doves in three-fourths of the late summer range, and the total population of a whole valley may congregate on one farm, or even in a single field. The flocks tend to cling together more closely. A small number of doves winter in this region, and the wintering birds are found almost entirely in concentrations of 50 or more individuals, usually on bottomland fields. Strays and small isolated flocks occur, but are unusual.

During the autumn period, when some of the doves are migrating and the remainder are forming into the typical winter concentrations, I have often observed particularly well-organized flocks of 10 to 20 birds whose members have, in my experience, always proved to be adult males. These male flocks fly in close formation, very much like sandpipers, to use Bent's comparison, and the birds are wary and hard to approach. Flushing or even shooting will not cause one of these units to

break up more than momentarily. On October 15, 1939, four birds were killed out of such a flock, and gonad examination proved all to be adult males, the testes averaging over 6 mm. in length, which is twice the size of testes in young birds. On October 3, 1941, two birds were shot from a similar flock of 12, and these also were adult males. This flock was seen two days later with 10 members, which would suggest some degree of stability in its make-up. The earliest date on which I have observed a male flock was September 16 (1942), and one of these birds also proved to be an adult. Therefore, in addition to increasing gregariousness among the doves as fall progresses, there seems to be a partial segregation of adult males into small, closely united flocks. All adult males are not found in such flocks, for even in mid-October many have been killed along with females and young.

Summary

The autumn feeding and flocking habits of Mourning Doves were studied in south-central Missouri from 1939 through 1942.

Mourning Doves, being unable to scratch or to cling to vertical stalks, select their food from seeds available on the surface of the ground. The periodic adjustments in their fall feeding habits are apparently conditioned by changing availability of surface foods.

Wheat fulfills the Mourning Dove's needs until the stubbles become nearly exhausted. The birds then change to foxtail if a crop has been produced; if not, they make shift on the stubbles until the later weeds and crops ripen.

Mourning Doves apparently reject Korean lespedeza, although quail prefer it.

Part of the local Mourning Doves migrate, and an increasing degree of gregariousness is evident among the remaining birds. Winter concentrations begin to form on the best feeding grounds in September.

There is a tendency toward sexual segregation among the wintering doves, some of the adult males forming into separate flocks.

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